time and obesity. However, the deep sternal wound infection was exactly the same; 0.7% (14/1, 809) for one IMA vs 0.7% (5/658) for two IMA's. In the highest risk subgroup, i.e., diabetes, the overall wound infection rate was 2.4% (3/121) but this again does not differ from diabetics with a single IMA whose sternal wound infection rate was 1.4% (7/486) ($p = 0.48$).

Conclusion: The use of bilateral internal mammary arteries using these dual techniques in pts has a very low overall sternal wound infection 0.7% (5/568). Importantly, it is exactly the same as single IMA's. In diabetic mellitus pts it is modestly elevated to 2.4% (3/121) but is not statistically different from single IMA's with diabetes. Avoiding electro cautery and bone wax resolves the issue of BIMA vs IMA in most instances with regard to deep sternal infection and results in a minimal deep sternal wound infection rate with or without diabetes.

1064-168 Distinctive Hemodynamic Features of the Freestyle Aortic Bioprosthesis as Compared to Stented Bioprosthesis

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The objective of this study was to evaluate the short, medium and long term hemodynamic performance of the Freestyle unstented prosthesis as compared to conventional stented prosthesis. The study includes 157 patients (pts) (69 M, 88 F) aged 48 to 85 years (mean 69 ± 7) operated for aortic insufficiency (11 pts), stenosis (58 pts) or mixed disease (88 pts) and prosthesis size (mm, n pts) were 19 (4), 21 (22), 23 (42), 25 (52), 27 (37). Echocardiograms were done early (157 pts), 3–6 months (129 pts), 11–14 months (99 pts) and 23–25 months (21 pts) after operation. Distinctive hemodynamic features of the prosthesis compared to stented prosthesis are: 1. Hemodynamics improve significantly during the first 3–6 months (mean gradient −3.5 ± 4.0 mmHg ($p < 0.001$), effective orifice area (EOA) + 0.15 ± 0.26 cm^2 ($p < 0.05$)) and remain stable thereafter. 2. Average mean gradient (6 + 4 mmHg) at one year is markedly lower than in similar size stented prosthesis (e.g. Intact prosthesis = 22 ± 8 mmHg, Mosaïc prosthesis = 12 ± 6 mmHg). 3. In vivo EOA's are lower (−0.91 ± 0.35 cm^2) than EOA's calculated in vitro. As in stented prosthesis, there is a close correlation ($r = 0.77$) between EOA indexed for body surface area and mean gradient but with less evidence of patient-prosthesis mismatch. Incidence of trivial or mild aortic regurgitation was similar (e.g. 34% vs 29% in Intact prosthesis).

We conclude that the Freestyle prosthesis has better hemodynamics than stented bioprosthesis but that distinctive features need to be taken into account when interpreting echocardiographic results.

1064-169 Ventricular Reduction Surgery as a Treatment for Idiopathic Dilated Cardiomyopathy

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We report our single center experience with ventricular reduction surgery for the treatment of non-ischemic dilated cardiomyopathy in 7 patients, all of whom were ineligible for cardiac transplant. All were symptomatic NYHA functional class III or IV on background therapy consisting of ACE inhibitor, digoxin, and diuretics. The mean age was 66. Six patients had concomitant mitral and/or tricuspid valve repair. One patient had mitral valve replacement.

At average 26 days follow-up, there have been no deaths. Compared to preop, the postoperative mean parameters are as follows: NYHA functional class improved from 3.9 to 2.7 ($p = 0.015$). Echocardiographic derived LVEF using Simpson's rule improved from 21% to 34% ($p = 0.015$). LVEDD decreased from 69 mm to 58 mm ($p = 0.006$). LVEDV decreased from 217 cc to 117 cc ($p = 0.0003$). LVESV decreased from 169 cc to 77 cc ($p = 0.00005$). Peak aortic outflow velocity increased from 0.69 to 0.79 ($p = 0.10$). Mitral inflow deceleration time increased from 141 ms to 171 ms ($p = 0.08$). Mitral regurgitation improved from +2.7 to +1.6 ($p = 0.08$). Six month follow-up data including SF36 health survey results will also be presented.

In summary, ventricular reduction surgery appears to provide subjective and objective improvement in the early post-operative period in this small number of patients with nonischemic cardiomyopathy. Larger studies and longer follow-up is warranted.

1064-170 Comparison of Three Coronary Bypass Mortality Prediction Models: Results from the National Cardiovascular Network

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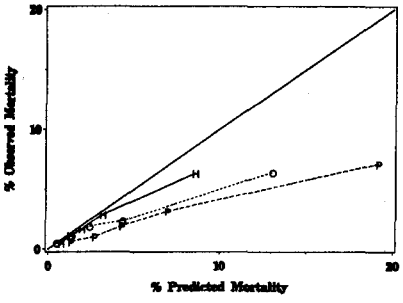
Assessment of risk-adjusted coronary artery bypass surgery (CABG) mortality results is an important means of monitoring quality of care. The National Cardiovascular Network is a volunteer organization (23 high-volume centers) dedicated to sharing clinical outcomes data. Using the NCN clinical database ($n = 34,521$), we compared the predictive accuracy of three published CABG risk-prediction methods: Parsonnet (P), O'Connor (O) and Hannan (H). The overall NCN in-hospital CABG mortality rate was 3.1% (2.6% in isolated CABG). Median age was 67 years, 29.2% were female, 9.4% had prior CABG, and 43% had prior MI. *Results:* The discriminatory abilities of each method for predicting in-hospital mortality were quite similar (area under ROC curves 0.73–0.74). Below, we display observed versus expected mortality by these three methods:



Conclusions: Existing CABG risk-prediction models tended to over-predict mortality in NCN data, particularly in high risk patients. Validation of risk-prediction models should be a required step in comparisons of outcomes data.

1064-171 Port-access Two-vessel Coronary Revascularization in the Dog

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Single-vessel coronary revascularization using port-access technology and cardiopulmonary bypass (CPB) has been achieved. Using this approach, we evaluated two-vessel coronary revascularization with a "T-graft" of an arterial conduit (superficial femoral artery [SFA]) placed end-to-side to left internal thoracic artery (LITA) in 5 dogs (24 ± 3 kg, mean ± SD). Under general anesthesia and single lung ventilation, LITA was harvested thoracoscopically. A limited anterior mediastinotomy (5 cm) was made. After heparinization, a 4–6 cm segment of SFA was anastomosed end-to side to LITA. Endovascular CPB system was placed peripherally and CPB instituted. Endoaortic clamp, inserted via the femoral artery, permitted ascending aortic occlusion and infusion of antegrade cardioplegia achieving cardioplegic arrest. The SFA-obtuse marginal artery anastomosis and LITA-LAD anastomosis were performed. The animals were weaned from CPB.

Results: All grafts were patent post-mortem. CPB time: 69 ± 13 min; aortic clamp time: 48 ± 9 min.

	Pre CPB	*Post CPB*
Cardiac output (L/min):	2.8 ± 0.7	2.7 ± 0.5
Wedge pressure (mmHg):	9 ± 1	8 ± 1

Conclusions: Using port-access technology, rotation of the heart is possible and two-vessel coronary revascularization with a "T-graft" can be performed safely in the dog. Multiple vessel coronary artery bypass grafting is a possible extension of this approach (using arterial conduits and sequential grafting).

1064-172 Previous Coronary Artery Surgery Has Little Influence on In-Hospital Outcome in Unstable Angina

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To determine whether previous coronary artery surgery (CAS) independently influenced in-hospital outcome after a new episode of unstable angina (UA),

484 consecutively admitted patients between 1992–1994 were divided into 2 groups: 357 patients without previous CAS (group 1) and 127 patients with previous CAS (group 2). These patients were prospectively followed for major complications including death, myocardial infarction after 24 h (MI), heart failure, sustained ventricular tachycardia or ventricular fibrillation. Group 2 patients were older (67 ± 13 y vs 62 ± 16 y, P = 0.002), more frequently male (66% vs 54%, P = 0.042), had more ST depression (22% vs 14%, P = 0.028), were more often diabetic (45% vs 32%, P = 0.010) and had more MIs (49% vs 30%, P = 0.001). Group 2 patients received PTCA (25.2% vs 25.2%, P = 0.998) and subsequent CAS (17.1% vs 15.7%, P = 0.729) just as frequently as in Group 1. There was a trend for more major cardiac complications in Group 2 (23% vs 16%, P = 0.069) but a similar incidence of MI or death (Group 2: 7.9% vs Group 1: 6.4%, P = 0.582). *Conclusions:* Despite a substantially higher incidence of risk factors, patients with previous CAS had remarkably similar outcomes as patients without previous CAS suggesting that this factor should have little influence on clinical management of UA.

1065 Pediatric/Congenital: Pulmonary Vascular Diseases and Young Adult Cardiology

Wednesday, March 19, 1997, Noon–2:00 p.m.
Anaheim Convention Center, Hall E
Presentation Hour: 1:00 p.m.–2:00 p.m.

1065-155 Abnormal Histology of the Pulmonary Vasculature in Neonates with Pulmonary Atresia and Ventricular Septal Defect

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Although proximal pulmonary artery (PA) size has been identified as a predictor of survival in patients with pulmonary atresia (PAT) and ventricular septal defect (VSD) without collaterals, little attention has been paid to the peripheral pulmonary vascular bed in neonates. Between 1982 and 1996, 44 patients with PAT/VSD underwent neonatal surgery (8 repairs and 36 palliations) with 14 deaths. Therefore, we reviewed the histology of the pulmonary vascular bed in 8 autopsied patients who died following neonatal surgery. Lung microscopy in 6/8 patients demonstrated important abnormalities of the distal pulmonary vasculature. These included small vessel constriction with failure of postnatal vascular remodeling (n = 4), muscular extension into alveolar pulmonary arteries (n = 3), diffuse intravascular thromboses (n = 2) and increased vessel tortuosity with intimal proliferation (n = 1). The immediate postoperative course of all 6 patients was characterized by low pulmonary blood flow and high pulmonary vascular resistance. In 5/6 the proximal PA's were small (< 5 mm). In 2/8 lung histology was normal, PA's were > 5 mm and death was due to sepsis and cerebral ischemia. These findings suggest an association between proximal PA hypoplasia and obstruction of the distal pulmonary bed with vasoconstriction and delayed maturation of vessels. The outcome of neonates with PAT/VSD and PA hypoplasia may be improved by the preoperative use of vasoactive mediators with antiproliferative and antithrombotic effects such as prostaglandin, nitric oxide and heparin which may enhance the maturation of the pulmonary vascular bed and prevent thrombosis.

1065-156 Reduced Mortality In Eisenmenger's Having Noncardiac Surgery

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Noncardiac surgery (NCS) in Eisenmenger (EISM) patients (pts) is associated with increased morbidity and mortality. Fifty-eight such pts (17 M, 41 F), aged 18–69 yrs (mean 41) who had been followed for up to 41.5 yrs (mean 9.3), were retrospectively evaluated for any NCS done at > 17 yrs of age.

Twenty-four pts had a total of 27 NCS at an age of 17–55 yrs (mean 29) including 9 tubal ligations, 4 neurosurgeries, 3 cholecystectomies, 3 hysterectomies, 3 vasectomies, and 1 each eye enucleation, hernia repair, hand surgery, tonsillectomy, and therapeutic abortion. There were 2 deaths (7%), 1 following spinal fusion and the other following appendectomy.

Fourteen of these NCS were performed at our institution including 11 under general anesthesia. The duration of anesthesia varied from 75–525 minutes (mean 165). All pts remained in sinus rhythm. The lowest systolic BP ranged from 78–115 mm Hg. Of those 11 pts, 9 were extubated immediately after surgery and 2 needed dopamine. Ten pts were discharged without any complications including 3 within 1 day of surgery. One death occurred 10 days following spinal fusion. This pt had the longest anesthesia (525 minutes) and an intraoperative systolic BP as low as 78 mm Hg. She also needed the largest fluid administration (6475 cc) in addition to postoperative mechanical ventilation and dopamine.

Conclusion: Adult EISM pts are at increased risk with NCS, but with current/modern technique, the risk of death is substantially less than previously thought. In the vast majority of cases, NCS can be undertaken without substantial morbidity and early extubation is achievable.

1065-157 The Fontan Procedure in Adults: Early and Late Results

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Between 1973 and 1994, 128 adult patients, ages 18 or greater, had the Fontan procedure (FP) performed at the Mayo Clinic. There were 13 operative deaths (10%), and there have been 23 late deaths (18%).

A 1996 questionnaire returned by 90 of 92 presently surviving patients, now 1 to 17 years post FP, revealed 80 percent to be in NYHA Class 1 or 2 and 20 percent in NYHA Class 3 or 4. Sixty-five percent were employed full-time, and 26 percent were employed part-time. Only 8 percent felt they were physically incapable of full-time employment. Forty-six patients had some college education and 29 had 4 or more years of post highschool education. Fifty-two percent were married and 7 percent divorced. Four post FP females had attempted pregnancy resulting in 3 healthy infants and 1 spontaneous miscarriage without detriment to maternal health. When patients were asked to contrast their pre and post Fontan procedure quality of life, 89 percent stated they were improved after operation; 51 percent markedly, 23 percent moderately, and 15 percent mildly.

The FP can be performed in properly select adults with functional single ventricle with an operative mortality comparable to that achieved during childhood and adolescence. Late results reveal a significant late mortality but an improvement in quality of life for 89 percent of present survivors up to 17 years post surgery.

1065-158 Light and Electron Microscopy of Dilated Great Arteries in Congenital Heart Disease

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Dilatation of the ascending aorta (AAo) and pulmonary trunk (PT) in congenital heart disease (CHD) has been considered secondary to the basic anomaly. However, a dilated paracoarctation aorta and a dilated AAo above a bicuspid aortic valve (BAV) may harbor cystic medial necrosis (elastic fiber fragmentation, smooth muscle cell loss). The purpose of this study was to determine whether a similar developmental fault exists in other forms of CHD with great artery dilatation. *Methods:* 30 specimens (24 surgical biopsies, 6 necropsy) were derived from 27 patients aged 17 months to 81 years (m 44.2 years). AAo biopsies were from BAV (10); trileaflet calcific aortic stenosis (controls) (3); Marfan (3); truncus arteriosus (1); Fallot's tetralogy with pulmonary atresia (1); complete transposition of the great arteries (DTGA) (1); and the paracoarctation aorta (4). PT biopsy was from Fallot's tetralogy with absent pulmonary valve. Necropsy specimens were from ruptured PT with Eisenmenger VSD (1) or shunted Fallot with pulmonary vascular disease (1), or from ruptured AAo with Eisenmenger VSD (1). All specimens were studied with elastica von Gieson connective tissue stains. All biopsies were studied by electron microscopy. Cystic medial necrosis was classified as: absent; non-specific (Grade 1); abnormal moderate (Grade 2) or abnormal severe (Grade 3). *Results:* Grade 2–3 AAo biopsies: BAV (4/10); Marfan (2/3); truncus (1/1); DTGA (1/1), paracoarctation aorta (3/4). Control biopsies were ≤ Grade 1. PT biopsy: Fallot's tetralogy with absent pulmonary valve Grade 2. AAo and PT necropsy specimens: all 6 were Grade 2–3. *Conclusions:* Cystic medial necrosis was found in the Marfan, BAV and paracoarctation aorta, and in the AAo of Fallot's tetralogy, DTGA, and Eisenmenger VSD; and was found in the PT of Fallot's tetralogy with absent pulmonary valve, Eisenmenger VSD, and shunted Fallot with pulmonary vascular disease. Great arterial dilatation may reflect a developmental fault acting in concert with the basic CHD anomaly.

1065-159 The Course and Outcome of Pregnancy in Women with Stenotic Lesions due to Congenital Heart Defects

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Due to the widespread availability of successful corrective surgery (S) in congenital heart disease (CHD), an increasing number of women reaches